Transforming Education: A Comprehensive Review of Generative Artificial Intelligence in Educational Settings through Bibliometric and Content Analysis

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Abstract

In the ever-evolving era of technological advancements, generative artificial intelligence (GAI) emerges as a transformative force, revolutionizing education. This review paper, guided by the PRISMA framework, presents a comprehensive analysis of GAI in education, synthesizing key insights from a selection of 207 research papers to identify research gaps and future directions in the field. This study begins with a content analysis that explores GAI's transformative impact in specific educational domains, including medical education and engineering education. The versatile applications of GAI encompass assessment, personalized learning support, and intelligent tutoring systems. Ethical considerations, interdisciplinary collaboration, and responsible technology use are highlighted, emphasizing the need for transparent GAI models and addressing biases. Subsequently, a bibliometric analysis of GAI in education is conducted, examining prominent AI tools, research focus, geographic distribution, and interdisciplinary collaboration. ChatGPT emerges as a dominant GAI tool, and the analysis reveals significant and exponential growth in GAI research in 2023. Moreover, this paper identifies promising future research directions, such as GAI-enhanced curriculum design and longitudinal studies tracking its long-term impact on learning outcomes. These findings provide a comprehensive understanding of GAI's potential in reshaping education and offer valuable insights to researchers, educators, and policymakers interested in the intersection of GAI and education.